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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/805,620	03/13/2001	Craig M. Carpenter	MI22-1563	3004

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EXAMINER

STOUFFER, KELLY M

ART UNIT	PAPER NUMBER
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1762

MAIL DATE	DELIVERY MODE
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07/25/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/805,620

Applicant(s)

CARPENTER ET AL.

Examiner

Kelly Stouffer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-35, 40, 48 and 49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27-35, 40 and 49 is/are rejected.
- 7) ☒ Claim(s) 48 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The examiner acknowledges the cancellation of claims 38, 43, and 45-47 in the reply filed on 13 June 2007.

Response to Arguments

2. Applicant's arguments, filed 13 June 2007, with respect to the 35 USC 112 2nd paragraph rejection of claim 40 and the 35 USC 103(a) rejection of claim 48 have been fully considered and are persuasive. The 25 USC 112 2nd paragraph rejection of claim 40 has been withdrawn.

3. Applicant's arguments filed 13 June 2007 with respect to the 35 USC 103(a) rejections of claims 27-35, 40 and 49 have been fully considered but they are not persuasive. The applicant argues that the references do not teach modifying the two flow rates of purge material as claimed in claim 27. As was stated in the previous office action, DiMeo teaches a process that uses purge gas to eliminate process gases from the chamber in between steps, shown more explicitly in Figure 2 of DiMeo and described in detail in column 9 lines 39-52. The reference is silent to using a purge curtain during deposition of the precursor, which is taught by Ohashi as outlined in the previous office action. Ohashi teaches in Figures 1A-1D that the outer holes of the showerhead, which supply the purge curtain, have different flow rates than the center holes, which supply the precursor gas. When combining the two references, one of ordinary skill in the art would recognize that the precursor of Ohashi may be replaced by

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purge gas as taught by DiMeo to purge the reactor and showerhead of precursor material. So when using Ohashi in the process of DiMeo as was stated in the previous office action, Ohashi shows that this section of the showerhead has an inherently different flow rate, and adding this extra purge material will cause the total flow rate of the purge material in the chamber to increase. Therefore, these rejections are maintained and repeated here.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 27-35, 40 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiMeo, Jr. et al. (US 6,972,430) in view of Ohashi et al. (US 6,059,885), in further view of Yamamuka et al. (US 6,312,526).

DiMeo teaches an ALD process that uses purge to eliminate process gases from the chamber between steps (column 5, lines 1-25), shown more explicitly in Figure 2 of DiMeo and described in detail in column 9 lines 39-52. The reference is silent to using a purge curtain.

However, Ohashi teaches an annular, concentric purge curtain being fed into the chamber, around the periphery of the substrate and along the chamber walls, while the process gas is being injected over the substrate (column 18, lines 28-67). The curtain extends downward from above the substrate holder (figures 7 and 8). Figure 7 shows the purge curtain flowing past the substrate holder. The solid walls that make up the hollow annular portions (21, 829) of figures 6 and 8 read on being a flow diverter (column 17, lines 10-19). These walls partially extend into the chamber from the top (first wall, lid) of the chamber. In figure 10, the direction of the apertures (1048) read on not directing the purge gas towards the substrate and minimizing back flow. The aspects of the lid are read on in the figures. The process prevents particles from

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adhering to the walls of the chamber by eliminating dead spaces by filling them with a purge curtain (column 2, lines 25-43). As the purge enters the section labeled "I" in figure 6, it goes through an inlet port and then exits this section through an exit port into the chamber.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use a purge curtain, as taught by Ohashi, in the process taught by DiMeo. By doing so, particles are prevented from adhering to the walls of the chamber. The combination of references above fails to teach the flow diverter extending below the substrate holder. However, Yamamuka teaches such a configuration in figures 11 and 12. By doing so, the chances of particles adhering to the walls are even further reduced as the temperature distribution is made smaller and the process gas is not likely to flow against the flow of the purge gas (column 10, lines 10-58). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to extend the flow diverter to below the substrate. By doing so, one would reap the benefits of further reducing the chances of particles adhering to the walls of the chamber.

As to claim 27, Figures 1a-1d and figure 4 of Ohashi, teach the flow profiles that should be used when only one gas is being supplied to the chamber. To further clarify the disclosure of the claimed relative purge rates, Ohashi teaches in Figures 1A-1D that the outer holes of the showerhead, which supply the purge curtain, have different flow rates than the center holes, which supply the precursor gas. When combining the two references, one of ordinary skill in the art would recognize that the precursor of Ohashi

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may be replaced by purge gas as taught by DiMeo to purge the reactor and showerhead of precursor material. Ohashi shows that this section of the showerhead has an inherently different flow rate, and adding this extra purge material will cause the total flow rate of the purge material in the chamber to increase.

As to claims 28-35, all other limitations may be found in column 18, lines 28-67, and figures 7 and 8 of Ohashi.

As to claim 40, Ohashi teaches a purge curtain flowing along chamber walls to prevent the precursor from migrating to the chamber walls and building up on their surface (column 2 lines 25-43). Any dead space that was near the chamber walls is therefore not contaminated by the precursor due to the purge curtain in Ohashi.

As to claim 49, the relative gas flow rates are described in Ohashi column 13 lines 35-65. The relative flow rates depend the diameter of the gas holes and the way they are arranged. The flow rates are adjusted to receive a desired flow pattern and to prevent disturbance of film formation. The relative gas flow rates are therefore result-effective. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the gas flow rates in the claimed ranges by routine experimentation absent evidence showing criticality for the claimed ranges.

Allowable Subject Matter

5. Claim 48 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. See applicant's arguments filed 13 June 2007.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kelly Stouffer whose telephone number is (571) 272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

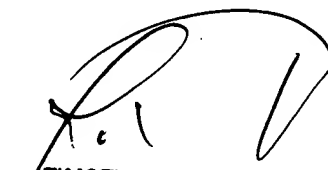
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kelly Stouffer
Examiner
Art Unit 1762

kms



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER